CHAPTER 6. RESOURCE COMMITMENTS

This chapter describes the unavoidable adverse impacts, short-term uses of environmental resources versus long-term productivity, and irreversible and irretrievable commitments of resources associated with cleaning, isolating, and stabilizing the high-level waste (HLW) tanks and related systems at the Savannah River Site (SRS). This chapter also includes discussions about U.S. Department of Energy (DOE) waste minimization, pollution prevention, and energy conservation programs in relation to implementation of the proposed action.

6.1 Unavoidable Adverse Impacts

Implementing any of the alternatives considered in this environmental impact statement (EIS) for closure of the HLW tanks at SRS would result in unavoidable adverse impacts to the human environment. The construction and operation of a saltstone mixing facility in F and H Areas (combined with continued operation of the current Saltstone Manufacturing and Disposal Facility in Z Area) under the Fill with Saltstone Option, or the construction and operation of temporary batch plants for grout production in F and H Areas under the Fill with Grout Option, would result in minimal short-term adverse impacts to geologic resources and traffic, as described in Chapter 4. These actions are not expected to impact cultural resources. Short-term impacts span from the year 2000 through final closure of the existing HLW tanks in approximately 2030. Generally, all construction activities would occur within the boundary of the tank farms (67 acres total) in an already developed industrial complex. An additional 1 to 3 acres would be required outside the fenced areas as a lay-down area to support construction activities under the Stabilize Tanks Alternative and the Clean and Remove Tanks Alternative.

Excavation of backfill material from an onsite borrow area could result in potential adverse impacts to geologic and surface water resources. Under the Stabilize Tanks Alternative, the soil elevation configurations surrounding four tanks in F Area and four tanks in H Area would require backfill soil to bring the ground surface at these tanks up to the surrounding surface elevations, to prevent surface water from collecting in the surface depressions. An estimated 170,000 cubic meters of soil would be required to fill the depressions to grade. Under the Clean and Remove Tanks Alternative, 356,000 cubic meters of soil would be required to backfill the voids left by removal of the tanks. As part of the required sediment and erosion control plan (using Best Management Practices), storm water management and sediment control measures (i.e., retention basins) would minimize runoff from these areas and any potential discharges of silts, solids, and other contaminants to surface water streams. Any storm water collected in the lined retention basins would be sent to Fourmile Branch (if uncontaminated rainwater), to the Effluent Treatment Facility for removal of contaminants, or rerouted to the tank farms for temporary storage prior to treatment. In addition, use of Best Management Practices would minimize any short-term adverse impacts to geologic resources.

Impacts from the borrow site development would include the physical alteration of 7 to 14 acres of land (and attendant loss of potential wildlife habitat) and noise disturbances to wildlife in nearby woodlands, assuming woodlands are present. Any site selected for the borrow area would be within the central developed core of the SRS, which is dedicated to industrial facilities. There would be no change in overall land use patterns on the SRS.

Adverse impacts to ecological resources would be minimal and short-term because most activities would occur within the previously disturbed and fenced areas. Although noise levels would be relatively low outside the immediate areas of construction, the combination of construction noise and human activity probably would displace small numbers of animals associated with an approximate 20-acre area surrounding the F and H Areas.

6.2 Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The proposed locations for any new facilities would all be within developed industrial landscapes. Each of the options for the Stabilize Tanks Alternative would require approximately 1 to 3 additional acres for lay-down areas. The existing infrastructure (roads and utilities, etc.) within the F and H Areas is sufficient to support the proposed facilities.

For both F- and H-Area saltstone mixing facilities, after the operational life (i.e., all tanks are filled and closed), DOE could decontaminate and decommission the facilities in accordance with applicable regulatory requirements and restore the area to a brown-field site that would be available for other industrial use. Appropriate National Environmental Policy Act (NEPA) review would be conducted prior to the initiation of any decontamination and decommissioning action. In all likelihood, none of the sites would be restored to a natural terrestrial habitat (DOE 1998).

The project-related uses of environmental resources for the implementation of any of the proposed alternatives are characterized in the following paragraphs:

- Groundwater would be used in tank washing and cleaning and to meet process and sanitary water needs over the short-term impact period (i.e., 2002 to 2030). Long-term groundwater use would be limited to amounts necessary to support sanitary and drinking water needs during monitoring of the institutional area. After use and treatment (in the F- and H-Area Effluent Treatment Facility), this water would be released through permitted discharges into surface water streams. Therefore, the withdrawal, use, and treatment of groundwater would not affect the long-term productivity of this resource.

- Air emissions associated with implementation of any of the alternatives would add small amounts of radiological and nonradiological constituents to the air of the region. During the short-term impacts period (i.e., 2002 to 2030), these emissions would result in additional loading and exposure, but would not impact SRS compliance with air quality or radiation exposure standards. During the long-term impacts period, air emissions associated with the proposed action would be negligible. Therefore, there would be no significant residual environmental affects to long-term environmental productivity.

- Radiological contamination of the groundwater below and adjacent to the F and H Areas would occur over time. Because the bottoms of some tank groups in the H Area lie beneath the water table, the contaminants from these tanks could be released directly into the groundwater. In addition, some contaminants from each tank farm could be transported by groundwater through the Water Table and Barnwell-McBean Aquifers to the seepline along Fourmile Branch. For tanks situated north of the groundwater divide in the H-Area Tank Farm, contaminants released to the Water Table or Barnwell-McBean Aquifers may discharge to unnamed tributaries to Upper Three Runs or migrate downward to underlying aquifers. Beta-gamma dose and alpha concentrations would be below Maximum Contaminant Levels (MCL) at the seepline in both F and H Areas for two of the three options (i.e., Fill with Grout, Fill with Sand) under the Stabilize Tanks Alternative. In addition, the No Action Alternative would exceed the MCL at the seepline. DOE calculated peak radiation dose to aquatic and terrestrial receptors at the seepline and receiving surface water and compared the dose to the limit of 1.0 rad per day. Results indicated that all calculated absorbed doses to the referenced organisms are below regulatory limits and would, therefore, have no impact on the long-term productivity of the ecosystem at the seepline.

- Residual contaminants remaining in the HLW tanks after closure and following the period of institutional control could result in long-term impacts to public health. DOE evaluated the impacts over a 10,000-year period, in which the contaminants would be leached from the tank structures to the groundwater. The seepline was determined to be the area of greatest concern (i.e., area of maximum dose). Results indicated that the maximum dose to an adult receptor at the seepline for either tank farm is 6.2 millirem (mrem) for the No Action Alternative. This dose is less than the 100-mrem public dose limit. Based on this low dose, DOE would not expect any long-term productivity health effects to an adult receptor.

- The management and disposal of waste (low-level, hazardous, mixed, industrial, and sanitary) and non-recyclable radiological waste over the project's life would require energy and space at SRS treatment, storage, or disposal facilities (e.g., Z-Area Saltstone Facility, E-Area Vaults, Consolidated Incineration Facility, and Three Rivers Sanitary Landfill). The land required to meet the solid waste needs would require a long-term commitment of terrestrial resources. DOE established a future use policy for the SRS for the next 50 years in the 1998 *Savannah River Site Future Use Plan* (DOE 1998) and the *Land Use Control Assurance Plan*. This report sets forth guidance that would exclude the tank farms and associated waste disposal areas from non-conforming land uses. Therefore, this policy ensures that the areas would be removed from long-term productivity.

6.3 Irreversible and Irretrievable Resource Commitments

Resources that would be irreversibly and irretrievably committed during the implementation of HLW tank closure alternatives include those that cannot be recovered or recycled and those that are consumed or reduced to unrecoverable forms. The commitment of capital, energy, labor, and material during the implementation of HLW tank closure alternatives would generally be irreversible.

Energy expended would be in the form of fuel for equipment and vehicles, electricity for facility operations (e.g., bulk waste removal and production of grout at batch plant[s]), production of steam (i.e., for operation of ventilation systems on the waste tanks and heating of the cleaning solutions), and human labor. Construction (e.g., new saltstone mixing facilities) would generate nonrecyclable materials such as sanitary solid waste and construction debris. Implementation of any of the options for the Stabilize Tanks Alternative would generate nonrecyclable waste streams such as radiological and nonradiological wastes including liquid, low-level, hazardous, mixed low-level, and industrial. For example, oxalic acid cleaning would require between 225,000 and 500,000 gallons of oxalic acid for washing of each Type III tank (see Section 4.1.10 for greater detail). However, certain materials (e.g., copper and stainless steel) used during construction and operation of any proposed facility or facilities could be recycled when the facility is decontaminated and decommissioned. Some construction materials, particularly those associated with existing F- and H-Area Tank Farm facilities would not be salvageable, due to radioactive contamination. Table 6-1 lists estimated requirements for materials consumed during the closure of a single Type III tank.

The implementation of the any of the HLW tank closure alternatives considered in this EIS, including the No Action Alternative, would

Table 6-1. Estimated maximum quantities of materials consumed for each Type III tank closed.[a]

Materials	Stabilize Tanks Alternative: Fill with Grout Option	Stabilize Tanks Alternative: Fill with Sand Option	Stabilize Tanks Alternative: Fill with Saltstone Option	Clean and Remove Tanks Alternative	No Action Alternative
Oxalic acid[b] (4 percent) (gallons)	225,000	225,000	225,000	500,000	-
Sand (gallons)	-	2,640,000	-	-	-
Cement (gallons)	2,640,000	-	52,800	-	-
Fly ash	-	-	Included in	-	-
Boiler slag	-	-	saltstone	-	-
Additives (grout) (gallons)	500	-	-	-	-
Saltstone (gallons)	-	-	2,640,000	-	-

a. The SRS HLW tank systems includes four tank designs (Types I, II, III, and IV). Estimates were developed for closure of a single Type III tank system. Closure of a Type III tank system represents the maximum material consumption, relative to the other tank designs. Waste generation estimates for closure of the other tank designs are assumed to be: Type I – 60 percent of Type III estimate, Type II – 80 percent of Type III estimates, and Type IV – 90 percent of Type III estimate (Johnson 1999a).

b. At the present time, potential safety considerations restrict the use of oxalic acid in the HLW tanks (see Section 2.1).

require water, electricity, and diesel fuel. Table 6-2 lists the utilities and energy that would be consumed as a result of implementing each of the proposed alternatives.

Water would be obtained from onsite groundwater sources. Electricity, oxalic acid, sand, and diesel fuel would be purchased from commercial sources. These commodities are readily available, and the amounts required would not have an appreciable impact on available supplies or capacities.

6.4 Waste Minimization, Pollution Prevention, and Energy Conservation

6.4.1 WASTE MINIMIZATION AND POLLUTION PREVENTION

DOE has implemented an aggressive waste minimization and pollution prevention program at SRS at the site-wide level and for individual organizations and projects. As a result, significant reductions have been achieved in the amounts of wastes discharged into the environment and sent to landfills, resulting in significant cost savings.

To implement a waste minimization and pollution prevention program for the closure of the HLW tanks, DOE would characterize waste streams and identify opportunities for reducing or eliminating them. Emphasis would be placed on minimizing the largest waste stream, radioactive liquid waste, through source reductions, efficiencies, and recycling (if possible). Selected waste minimization practices could include:

- Process design changes to eliminate the potential for spills and to minimize contamination areas
- Decontamination of equipment to facilitate reuse
- Recycling metals and other usable materials, especially during the construction phase of the project
- Preventive maintenance to extend process equipment life

Table 6-2. Total estimated utility and energy usage for the HLW tank closure alternatives.[a]

	Stabilize Tanks Alternative				
	Fill with Grout Option	Fill with Sand Option	Fill with Saltstone Option	Clean and Remove Tanks Alternative	No Action Alternative
Water (gallons)	48,930,000	12,840,000	12,840,000	25,680,000	7,120,000
Electricity	NA	NA	NA	NA	NA
Steam (pounds)	8,560,000	8,560,000	8,560,000	17,120,000	NA
Fossil fuel (gallons)	214,000	214,000	214,000	428,000	NA
Total utility cost	$4,280,000	$4,280,000	$4,280,000	$12,840,000	NA

a. Source: Johnson (1999a,b,c,d).
b. NA = Not applicable to this alternative. Utility and energy usage for these alternatives would not differ significantly from baseline consumption.

- Modular equipment designs to isolate potential failure elements, so as to avoid changing out entire units
- Use of non-toxic or less toxic materials to prevent pollution and minimize hazardous and mixed waste streams
- Gloveboxes to eliminate the need for plastic suits and air hoses during maintenance activities and line breaks
- Incineration at the Consolidated Incineration Facility and other volume reduction techniques (i.e., compaction, cutting) to reduce waste volumes.

During construction, DOE would implement actions to control surface water runoff and construction debris and to prevent infiltration of contaminants into groundwater. The construction contractor would be selected, in part, based on prior pollution prevention practices.

6.4.2 ENERGY CONSERVATION

SRS has an active energy conservation and management program. Since the mid-1990s, more than 40 onsite administrative buildings have undergone energy-efficiency upgrades. Representative actions include the installation of energy-efficient light fixtures, the use of occupancy sensors in rooms, use of diode light sticks in exit signs, and the installation of insulating blankets around hot water heaters. Regardless of location, the incorporation of these types of energy-efficient technologies into facility design, along with the implementation of process efficiencies and waste minimization concepts, would facilitate energy conservation by any of the tank closure alternatives.

References

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